

SECTION 2: U.S. AND CHINESE EFFORTS TO PROMOTE SOLAR AND WIND ENERGY MANUFACTURING

Introduction

The United States and China each have identified alternative energy equipment production, in particular solar and wind technology, as a potential source of high-wage employment and an opportunity to export high-value-added goods to the world.

The Obama Administration has repeatedly emphasized green technology's role in job creation and highlighted green technology in its 2010 National Export Initiative, which is intended to double the level of U.S. exports within five years. According to the U.S. Department of Commerce, the green sector has the potential to fuel economic growth in the immediate future. More than two dozen states have also identified green technology's potential to create jobs and to revitalize manufacturing areas that have been damaged by imports, outsourcing, and the loss of export markets abroad. This section is crafted under the assumption that global demand for green technology will continue. As part of its examination of the role of China in the green technology sector in 2010, the Commission held a hearing on July 14 in Toledo, Ohio, a center for photovoltaic research and production and a possible site for a Lake Erie offshore wind turbine farm. The Commission also sought to compare the efforts of the United States and Ohio to develop wind and solar power to the plans by the government of China to develop a globally competitive industry in these technologies.

China has added alternative energy to its growing list of favored and subsidized industries. It has identified key domestic performers and funneled resources to these companies in an effort to strengthen their global market share.¹⁰⁰ At the same time, China has made its own market increasingly difficult for foreign companies to enter and to compete against Chinese firms. One European official, Arnulf Jager-Waldau, the head of the European Commission's Joint Research Centre's renewable energy section, described China's endeavors in the solar market:

[China and Taiwan have] an industrial policy and a means to build up industry and make a profit, whereas in the United States and in Europe [the solar industry] is viewed as a green technology [more] intended to combat global warming.¹⁰¹

Green energy research and production are specifically included in China's 11th Five Year Plan. This plan is intended to be implemented by the central, provincial, and local governments and by state-owned and state-controlled companies. Virtually all the power

production, distribution, mining, and natural gas and petroleum industries in China are government owned or controlled.¹⁰² In fact, almost every aspect of the energy market in China is “dominated” by state-owned enterprises and supervised by the State Assets Supervision and Administration Commission, a branch of the central government that oversees state-owned companies. Add the energy companies operated by provincial and municipal governments, and “virtually all electricity generation” and most transmission equipment, including renewable energy equipment, is produced by state-owned enterprises, according to a 2010 report from the law firm of Dewey & LeBoeuf.¹⁰³

Energy analysts generally agree that Chinese policies on renewable energy research, development, and production are comprehensive and heavily funded by the government over the long term. This is in contrast to U.S. policies that are too often uncoordinated among levels of government and subject to the uncertainty of the annual appropriations process on the federal and state levels.¹⁰⁴

China’s immense size, its three decades of rapid economic growth, and its relatively inefficient power grid have caused its energy demands to expand rapidly. According to the International Energy Agency, China by 2006 was already the world’s largest emitter of carbon dioxide and became the world’s largest energy user in 2009.¹⁰⁵ China has responded with policies to expand renewable energy production, citing economic, environmental, and national security reasons.¹⁰⁶ As part of its energy policy, China intends to service this market with domestic production.* Notes one study of China’s renewable energy policies:

*Chinese planners have indicated their intention that eventually most or all of the renewable energy equipment installed in China will be made in China, will be based on Chinese-owned intellectual property, and will embody Chinese-developed standards. This objective is being advanced through a sweeping array of laws, regulations and other measures which establish local content requirements for renewable energy projects.*¹⁰⁷

Both the United States and China have focused on wind and solar energy technology for renewable energy in the domestic market. China had initially focused almost exclusively on large hydroelectric projects prior to this decade but has since shifted focus. The environmental damage associated with some of the hydroelectric programs, including the large Three Gorges Dam, reduced support for the costly approach.¹⁰⁸ Displacement of Chinese citizens to make way for the construction and flooding of farmland has led to some social unrest.¹⁰⁹

*China has refuted the statistics released by the International Energy Agency. The National Bureau of Statistics and the National Energy Agency asserted that in 2009, China consumed at least 200 million tons of oil equivalent less than the United States. Xinhua, “China dismisses IEA [International Energy Agency] analysis of it being the world’s top energy user,” July 20, 2010. http://news.xinhuanet.com/english2010/china/2010-07/20/c_13406190.htm.

Wind

China has deployed a relatively modest 12.2 gigawatts of wind power as of 2010* compared to China's planned capacity of 30 gigawatts of wind power¹¹⁰ by 2020, but U.S. studies of the China market predict a rapid increase in wind power production. The United States and China are expected to account for 65 percent of global demand for wind products in 2010. U.S.-based companies currently account for 12 percent of production capacity, while China accounts for 39 percent.¹¹¹

Investment in the wind sector in China surged in 2007 when China's chief government economic planning agency, the National Development and Reform Commission, created a renewable portfolio standard† for Chinese power companies. In 2007, 25 Chinese companies were producing wind turbines; by 2009, that number exceeded 100 producers.

The renewable portfolio standard requires that larger power companies have 3 percent of renewable capacity by 2010 and 8 percent by 2020. Wind farms are also eligible for a 50 percent value added tax rebate on wind turbines and related equipment. As part of China's efforts to meet these goals, the National Development and Reform Commission plans a massive program of "Three Gorges in the Air" wind farms. These farms are large-scale wind farms with large Chinese-made wind turbines.

Another key development in 2009 was a ban in China on deployment of turbines of less than 1,000 kilowatts for most projects, on the grounds of inefficiencies. The ban had a discriminatory effect on imported turbines, since most of the smaller models are produced by European and American companies. Larger wind turbines are more expensive and require substantial new investment to build but require comparatively less maintenance and can be more efficient, because they require fewer installations. But the larger wind turbines require new investment by manufacturers. Many foundries in the United States, for example, are reluctant to invest in new, larger molds for the larger turbine casings unless they can be guaranteed a substantial production run. Chinese state-owned foundries are under no such profit constraints.¹¹²

Greg Noethlich, the chief operating officer for an Ohio-based foundry, noted that while China has the fastest-growing market for wind turbine parts, U.S. producers of wind turbines face Chinese tariffs that decrease their competitiveness.¹¹³ Wind turbines imported into China currently face a 10 percent tariff, although China's bound rate‡ upon accession to the World Trade Organization (WTO) permits a tariff up to 11.7 percent.§ These rates could be modified under a future Environmental Goods and Services Agreement at the WTO.¹¹⁴ Such an agreement would look to reduce or

*This represents less than 1 percent of China's total energy portfolio in 2010.

†A renewable portfolio standard is a government mandate that utilities must provide a certain percentage of their total energy supply, or portfolio, through renewable sources.

‡A bound rate in international trade refers to the highest import tariff a WTO member agrees to upon accession to the body. Bound rates can vary from product to product and from WTO member to member.

§China's tariff schedule, which was negotiated during China's WTO accession, sets the upper limit on all tariffs for imports into China. It is based on a classification known as the Harmonized Tariff Schedule (HTS). The tariff on wind turbines is found under HTS code 8502, which covers a variety of wind turbine sizes. <http://www.mac.doc.gov/China/Docs/searchable/other/tariffs.pdf>.

eliminate barriers to trade in environmental goods and services. A proposed Environmental Goods and Services Agreement is included in the broader ongoing Doha Round of WTO negotiations on further trade liberalization under the WTO, but members have not yet agreed on the scope of the agreement.¹¹⁵

According to the International Trade Commission, wind turbines imported into the United States are assessed a tariff of 2.5 percent.¹¹⁶ While the National Development and Reform Commission claims to have phased out strict local content requirements for wind turbine manufacturing, foreign producers have yet to win a procurement contract. Chinese companies have capitalized on this protected market opportunity to increase domestic share from 18 percent in 2004 to 62 percent in 2008.¹¹⁷ In 2009 this trend continued, with all multinational firms bidding on National Development and Reform Commission projects quickly disqualified on technical grounds within three days of applying.

Figure 1: “Three Gorges in the Air” Wind Farm Locations in China

Province	Capacity (in gigawatts)
Gansu	12.7
Xinjiang	10.8
Inner Mongolia (2)	57.8
Jiangsu	10.0
Hebei	10.8
Jilin	23.0

Source: Thomas Howell et al., “China’s Promotion of the Renewable Electric Power Equipment Industry; Hydro, Wind, Solar, Biomass” (Washington, DC: Dewey & LeBoeuf LLP, March 2010), p. 53.

Wind projects in the United States have benefited from the production tax credit, which originated in the Energy Policy Act of 1992 and grants a federal income tax credit of \$0.021 per kilowatt hour available for electricity from utility-scale wind turbines. The availability of the program has, however, been inconsistent.¹¹⁸ The tax credit has expired three times in the last decade, only to be restored after delays. There has been a consistent drop in installations of wind power projects following each expiration of the credit. A study by Bloomberg New Energy Finance found that the unpredictability of the credit hampered its effectiveness. The production tax credit “never provided the level of long-term market visibility required to make a substantial manufacturing investment,” the study found.¹¹⁹

Manufacturers and suppliers in the industry agreed with this assessment. “The timing and planning framework for most manufacturers is much longer than one year,” said Ty Haines, vice president of Manufacturing Services of WIRE-Net, an Ohio-based manufacturing consulting company and member of the Great Lakes Wind Network.* Mr. Haines told the Commission that “[a] three-

*The Great Lakes Wind Network is a Cleveland-based consortium of wind turbine parts and services companies in the United States.

year time frame in place ... fits better with a business person's planning."¹²⁰

Solar

China recently has invested significantly in solar power generation in an effort to build the domestic market. This newer investment is likely to increase in light of the 2009 Golden Sun Demonstration Program, which provides investment subsidies up to 50 percent of the cost for grid-connected solar power systems.¹²¹ To date, 314 projects have been approved under the National Development and Reform Commission program, which will bring on line a total of 630 megawatts of new solar capacity. This would represent an increase of 4.5 times the current 140 megawatts of installed capacity. The United States had a far-larger 8,775 megawatts of total solar capacity in 2008.¹²²

The United States and other countries are increasingly turning to Chinese companies for solar panels as the quality and technical proficiency of Chinese manufacturers have increased. China is already the world's largest exporter of solar panels. In 2008, China exported 2,600 megawatts of photovoltaic panels, roughly one-third of the worldwide total.¹²³ China has been particularly competitive in the California solar market, with a 42 percent market share. However, when the financial crisis unfolded, many renewable energy projects were delayed, and China currently faces a production glut as large markets, notably Spain, have sharply reduced installations.

In 2009, the largest and lowest-cost manufacturer of solar panels, U.S.-based First Solar, Inc., announced plans to build the world's largest solar array in Inner Mongolia, the first foreign investment into China's solar energy sector. The terms of the project included production of some parts of the solar panels in China. As of August 2010, the deal was reportedly at risk over concerns about the tariff rate for imported solar panels and the price China would pay for power generated at the site.¹²⁴ A planned June 1 date to break ground on construction was missed, and the *Washington Post* reported that Chinese companies "complained openly" that such a large contract had gone to a foreign firm.¹²⁵ First Solar has denied media reports that the deal has broken down.

The main incentive for solar energy production in the United States is the investment tax credit, which provides a federal income tax credit for up to 30 percent of the expense of a solar project. The Emergency Economic Stabilization Act of 2008 extended the program for eight years, to 2016. The administration recently announced grants of \$1.85 billion to help construct a total of three solar plants in Arizona, Indiana, and Colorado.

Two incentives were included in the American Recovery and Reinvestment Act of 2009, an investment tax credit under section 48c of the tax code and a Treasury Department grant program. An official from U.S.-based First Solar, Inc., testified at the Commission's hearing that several aspects of the American Recovery and Reinvestment Act were key supports for the U.S. solar industry. However, this witness noted that these programs were considered likely to expire and do not offer long-term support.¹²⁶

American Recovery and Reinvestment Act programs include the \$2.3 billion for advanced energy manufacturing projects contained in the section 48C manufacturing investment tax credit. Another program praised by First Solar was the section 1603 Treasury Deployment Grant Program, which provided a grant in lieu of the investment tax credit for solar projects. However, this program will expire at the end of 2010. Kathy Weiss, vice president for government affairs at First Solar, testified that the “vital” program helps attract investors for U.S.-based solar projects and needs to be extended through 2012.¹²⁷

According to Ms. Weiss, one flaw in the implementation of these programs has been the different funding levels each received. While the Treasury grant for solar projects was uncapped, the manufacturing investment tax credit was capped at \$2.3 billion.¹²⁸ This has led to a disparity between available U.S. production of solar panels and demand for new solar projects. This disparity has been met by foreign suppliers, mostly Chinese.

U.S. firms are losing global market share in the green technology sector, mostly to China, with solar panel manufacturing experiencing a particularly severe loss. As various sources have noted, China became the largest producer of solar panels in the world in 2008, shipping 2,600 megawatts of photovoltaic panels, enough for about one-third of annual world supply.^{129,130}

A recent study by the Pew Charitable Trust found that China was the largest investor in renewable energy of the Group of Twenty (G-20) members* in 2009, while the United States continued to have the largest capacity in its renewable energy sector. China topped the investment list with \$34.6 billion invested in the sector, or 30.5 percent of the group’s total.¹³¹ The United States was the second-largest investor, with \$18.6 billion, or 16.4 percent of the total. As of 2009, China had 52.5 gigawatts of renewable energy capacity installed, representing a 78.9 percent five-year growth rate. The United States had 53.4 gigawatts of renewable capacity as of 2009, representing a growth rate of 24.3 percent during a five-year period. While the United States still had the largest renewable energy capacity at the end of 2009, China’s stated renewable energy targets will mean Chinese capacity should surpass U.S. capacity in the next one to three years.¹³²

“The United States risks losing out on this opportunity, as it lags behind economic competitors in Asia and Europe in the production of virtually all clean energy technologies,” said energy analyst Devon Swezey of the Breakthrough Institute at the Commission’s June hearing in Toledo.¹³³ “China, in particular, has emerged as a clean energy powerhouse,” he said. Currently, the United States has only four of the world’s top 30 renewable energy manufacturers, while China and Europe are moving ahead with “comprehensive clean energy investment strategies.”¹³⁴

Contrasted with policies in China’s five- and ten-year energy plans, current U.S. federal policies on renewable energy promotion are generally short term and are not always fully funded. For ex-

*The Group of twenty countries is comprised of the European Union and the remaining 19 largest national economies of the world. Members are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, the Republic of Korea, Turkey, the United Kingdom, and the United States.

ample, renewable energy projects in the United States qualify for the investment tax credit that covers 30 percent of project costs. But that provision is subject to yearly changes that make the return on investment highly uncertain.¹³⁵

These diverging strategies have created an imbalanced trade in green technology bilaterally. Based on 2008 data, the United States had a trade deficit in the renewable energy sector of \$6.4 billion, up from a trade deficit of just under \$300 million in 1997.¹³⁶

A recent study by the Congressional Research Service found that, with the exception of biofuels such as ethanol, federal subsidies “are generally authorized for short periods and must be periodically reauthorized . . . (and) are not always fully funded in appropriations legislation.”¹³⁷

Federal Incentives and Government Support

The federal government has required its agencies to increase purchases of renewable energy to a minimum of 7.5 percent of total electricity by 2013, and agencies receive double credit for energy generated on their facility site.* A 2007 executive order augmented this requirement to stipulate that half of the requirement must be met through renewable energy projects built after January 1, 1999.

New private facilities in the United States can also receive a subsidy of \$0.015 per kilowatt hour for the first ten years of a facility’s operation through the Renewable Energy Production Incentive.† This program is authorized through fiscal year 2026 but must be funded annually through Department of Energy appropriations.

However, witnesses at the Commission’s hearing suggested that a federal renewable portfolio standard, similar to those now in use in some of the states, would be a key step toward developing more domestic manufacturing. Such an action would increase the demand for renewable sources of electricity and, eventually, the supply, according to Ethan Zindler, from Bloomberg New Energy Finance.¹³⁸ “Such a demand-side policy, when coupled with supply-side supports in the stimulus, could trigger substantial additional investment in the U.S.,” Mr. Zindler said. “Clean energy projects would most likely be the first to benefit, as utilities would be under additional pressure to sign power purchase agreements with them to meet the national goals.”¹³⁹

Ohio’s Actions

Most of the renewable capacity currently in place in the United States is a result of state-level initiatives, the Congressional Research Service report notes. Among the states, 30 have a renewable portfolio standard, which requires a certain percentage of electricity to come from renewable sources.¹⁴⁰ The 2008 Ohio renewable portfolio standard requires that by 2025, 25 percent of all electricity sold in the state must come from renewable energy sources.¹⁴¹ The Ohio measure stipulates that half of the 25 percent must be generated within the state of Ohio. Furthermore, while 12.5 percent may come from sources such as nuclear power plants and

*For example, a solar plant on-site that generated 100 megawatts of electricity would receive credit for 200 megawatts.

†The Renewable Energy Production Incentive program was created in the Energy Policy Act of 1992 and amended in 2005.

clean coal technology that reduces carbon dioxide emissions, 12.5 percent must come from wind, solar, hydropower, geothermal, or biomass.

Ohio has looked to promote green technology production to bolster manufacturers in the state that can no longer compete with cheaper imports, particularly from China. Toledo, long known as “the glass city” for its production of flat, laminated, and tableware glass used in buildings and automobiles, is now dotted with solar panel makers operating from old glass factories.* There is “a wealth of experience and job skill just waiting to be harnessed,” David McCall, district one director of the United Steelworkers Union, testified before the Commission.¹⁴² To this end, the University of Toledo has created an incubator for such firms. The incubator supplies office space, financing, and expertise to startup companies. One such company is First Solar, now one of the top solar panel producers worldwide. “Green companies involved in solar, wind, and biomass products are well established in the region and many of the job skills needed for these industries have been developed by the region’s ties to the auto industry,” noted the *Toledo Blade*.¹⁴³

Chinese Manufacturing in Wind, Solar, and Batteries, and Government Support

China’s solar capacity was deliberately developed with the goal of exporting to overseas markets, in contrast to Chinese wind producers, who primarily service the booming domestic market for wind farms. During a July Commission visit to Zhong Hang Huitong Wind Power Equipment Company, a company official noted that only 10 percent of the company’s products are exported. However, China’s wind industry has recently begun to be seen as an exporting industry, officials confirmed. Despite only recently entering the export market, China is now the largest producer of wind turbines.¹⁴⁴

*China is also on track to make nearly half of the world’s wind turbines this year. China offers financial incentives for utilities to use wind power, which is less costly than solar power, and the country passed the United States last year as the world’s largest wind turbine market.*¹⁴⁵

Green energy programs benefit from Chinese high-technology and basic research programs.¹⁴⁶ China’s 11th Five Year Plan (2006–2010) built upon previous programs and made large-scale renewable energy products the focus of the basic research program.¹⁴⁷ China’s Renewable Energy Law of 2005 was another key piece of legislation designed to spur development and use of renewable energy. The law imposed a fee on all electricity users to subsidize the development of renewable energy sources.

*Witnesses generally agreed, however, that the United States has lost ground in traditional manufacturing as well as next-generation manufacturing sectors such as green technology. As an example, according to a recent *Wall Street Journal* article, Toledo had to rely on Chinese glass to complete the Toledo Museum of Art, because no domestic producer could fulfill the order for the curved glass panels called for in the design of the new pavilion on the art of glass-making. James T. Arredy, “In Toledo, the ‘Glass City,’ New Label: Made in China,” *Wall Street Journal*, August 29, 2010. <http://online.wsj.com/article/SB10001424052748703428604575418680197041878.html>.

Through these policies, China has invested in a comprehensive array of renewable energy products, including hydropower, wind power, solar power, and biomass. China's state-owned electricity sector has implemented a renewable portfolio standard. China has also required that wind and biomass each account for 30 gigawatts of power generation in China by 2020.¹⁴⁸ As a result of these policies and Chinese policy preferences for using domestic producers, Chinese production has steadily grown in domestic market share among these products.

Battery Technology and Electric Vehicles

U.S. and Chinese firms are both engaged in active research and development for electric vehicles and their fuel cells, or batteries. During a Commission visit, one Chinese producer demonstrated a state-of-the-art production facility. This company, Lishen Battery, a private company, has received \$14.9 million in startup subsidies from the Chinese government and was expecting a further \$104.6 million in the near term.

To spur the entry of electric vehicles into the market, China has created a mandate for increased vehicle emissions standards in the next ten years, with plans to reduce gasoline consumption by vehicles by 60 percent by 2020.¹⁴⁹ This is expected to spur the development of an electric vehicle market.

Recent reports have noted that China is considering a new technology transfer requirement for foreign automakers. China's Ministry of Industry and Information Technology is "preparing a 10-year plan aimed at turning China into 'the world's leader' in developing and producing battery-powered cars and hybrids," according to executives at four foreign car producers familiar with the plan.¹⁵⁰

China has offered subsidies to spur the development of the domestic electric vehicle sector, mainly through support for subnational government procurement.¹⁵¹ The government has launched a 10,000 vehicle demonstration project, and is also providing subsidies to help local government agencies purchase electric buses, taxis, and other public service vehicles. These subsidies will be up to \$7,300 (RMB 50,000) for hybrid vehicles and \$8,800 (RMB 60,000) for electric vehicles. Hybrid buses will receive up to \$61,456 (RMB 420,000), and electric buses will enjoy a subsidy of over \$73,000 (RMB 500,000). The Obama Administration has taken steps to spur production of electric vehicles and hybrids in the United States. This has taken the form of \$2.4 billion in Department of Energy grants included in the American Recovery and Reinvestment.^{152,153,154}

Section 301 Petition on Green Technology

On October 15, 2010, the Obama Administration announced it had launched a wide-ranging investigation into Chinese green technology policies.¹⁵⁵

The United Steelworkers Union had filed a petition under Section 301 of U.S. trade law requesting the Obama Administration challenge the subsidies that China extends to its energy sector, specifically those aids directed to alternative and clean energy. Their petition argues that a wide range of Chinese policies violate China's WTO commitments. The administration is required to file

a formal complaint against Chinese practices before the World Trade Organization at the end of a 90-day period if it verifies some or all of the allegations in the petition.¹⁵⁶

Among the charges in the petition are the following:

- China has substantial export restrictions on many raw materials, including rare earth metals through taxes, quotas, and quantitative restrictions. These restrictions place U.S. competitors at a disadvantage in global markets for goods that rely upon rare earth metals as a component, such as advanced batteries, solar panels, and wind turbines.
- China has provided grants and loans at discounted commercial rates through government programs and state-owned banks.
- China has favored wind power technology with export guarantees and insurance at below-market rates.
- China has required foreign firms to transfer technology in order to qualify for inclusion in joint ventures with Chinese companies and sales in the domestic market.

Illustrative List of Chinese Policies Promoting Green Technology

- *The Key Technology Research and Development Program* was established in 1982 and was China's first national research and development program aimed at dealing with environmental problems and pollution control. The program was funded to almost \$1 billion between 2001 and 2005.
- *The National High-Technology Development Program, or "863 Program,"* was created in 1986 to develop a range of technology. Green technology, including renewable energy, is now one of the top priorities for this program.
- *The National Basic Research Program, or "937 Program,"* is aimed at fundamental, basic research that complements technologies in the 863 Program. This program also has seen a substantial focus on green technology research at a more basic level.
- *The 2002 Government Procurement Law* promotes domestically sourced goods. State-owned companies dominate the energy sector.¹⁵⁷
- *The 2006 Renewable Energy Law* established a requirement that utilities pay full price for renewable energy sources while offering renewable-generated power to consumers at a discounted rate. The law was amended in 2009 to stipulate that Chinese energy suppliers were required to purchase all available renewable power generated in China, creating a further incentive to invest in the market.¹⁵⁸

**Illustrative List of Chinese Policies
Promoting Green Technology—Continued**

- *The 2007 Medium- and Long-Term Development Plan for Renewable Energy in China*, devised by the National Development and Reform Commission, stipulates that power companies that produce over 5 gigawatts of electricity include non-hydroelectric renewable energy amounting to 3 percent of total capacity by 2010 and 8 percent by 2020.
- *China's November 2008 stimulus plan* included a stipulation by nine government ministries that domestic products receive preferences. China later amended that requirement to stipulate that foreign-invested firms in China be granted the same preference as Chinese-owned companies after the October 2009 U.S.-China Joint Commission on Commerce and Trade.¹⁵⁹
- *China's two most recent five year plans*, the 10th Five Year Plan, from 2001 to 2005, and the 11th Five Year Plan, from 2006 to 2010, identified energy technologies as a key focus of both the 863 and the 937 programs. Hydrogen, fuel cells, energy efficiency, clean coal, and renewable energy received \$172 million in funding under the 11th Five Year Plan. That plan also made utility-scale renewable energy projects and new energy development the focus of the 937 Program.

Implications for the United States

In the area of alternative energy, China is following a familiar pattern of choosing an industry sector and showering it with a comprehensive mixture of subsidies and incentives. In this case, China also intends to establish certain alternative energy industries as “national champions” able to dominate world export markets. China has already developed the world’s largest manufacturing capacity in solar panels. Its capacity is far larger than that needed to satisfy domestic demand; 90 percent of the solar panels manufactured in China are exported. China also has a large number of installed wind turbines and is rapidly developing new technology for a growing global market. China’s domestic wind turbine industry operates behind a protectionist barrier. Only the largest wind turbines may be installed in China. This excludes many U.S. and European turbines, which are typically smaller.

The state government in Ohio has made solar panel technology a high priority. Like several other states, Ohio seeks to replace jobs lost in other manufacturing industries—notably glass, steel, and autos—with jobs in alternative energy, including manufacturing, installation, and maintenance of solar panels and wind turbines. Yet the United States and states such as Ohio are outmatched by China’s comprehensive programs of subsidies and domestic market protections.

In the context of previous health and safety problems with Chinese imports, renewable energy products from China, in particular battery cells, should be carefully evaluated for possible adverse health implications related to insufficient quality control.

Conclusions

- China is developing a leading wind turbine and solar panel manufacturing sector. These sectors are intended to become the dominant world suppliers while serving China's growing domestic market.
- China has set ambitious goals for the level of solar, wind, and nuclear power generation through its Renewable Energy Law and 11th Five Year Plan. This effort includes a substantial renewable portfolio standard, requiring that China's power supply further diversify by 2010 to emphasize noncoal and nonnuclear power sources.
- China has a well-developed, long-term strategy for investment in the green technology manufacturing sector, which gives it a competitive advantage.
- Ohio is one of 30 states that have adopted renewable portfolio standards designed to spur the deployment of renewable energy projects.